DIVISION 4
BASES

4-01 VACANT

4-02 GRAVEL BASE

4-02.1 Description

This work shall consist of constructing one or more layers of gravel base upon a prepared subgrade in accordance with these Specifications and in conformity with the lines, grades, depth, and typical cross-section shown in the Plans or as established by the Engineer.

4-02.2 Materials

Materials shall meet the requirements of the following section:

Gravel Base 9-03.10

4-02.3 Construction Requirements

Gravel base shall be uniformly spread upon the prepared subgrade to the depth, width, and cross-section shown in the Plans. Construction methods used shall meet the applicable requirements of Sections 4-04.3.

4-02.4 Measurement

Gravel base will be measured in the same manner prescribed for the measurement of crushed surfacing materials as set forth in Section 4-04.4 except as follows:

Where gravel base is specified, the Contractor may elect to substitute materials as described in Section 3-01.4(4). Crushed surfacing and gravel borrow, used in lieu of gravel base, will be measured and paid for as gravel base. In no case shall crushed surfacing, used in lieu of gravel base, be included in any bid items for crushed surfacing.

4-02.5 Payment

Payment will be made in accordance with Section 1-04.1, for the following bid item when shown in the proposal:

"Gravel Base", per ton, or per cubic yard.

4-03 VACANT

4-04 BALLAST AND CRUSHED SURFACING

4-04.1 Description

This work consists of constructing one or more courses of crushed stone upon a prepared subgrade in accordance with these Specifications in conformity with the lines, grades, depth, and typical cross-sections shown in the Plans or as established by the Engineer.

Surfacing materials and ballast may also be specified to be placed in stockpiles for future use.

4-04.2 Materials

Materials shall meet the requirements of the following sections:

Ballast	9-03.9(1)
Shoulder Ballast	9-03.9(2)
Crushed Surfacing	9-03.9(3)
Maintenance Rock	9-03.9(4)

4-04.3 Construction Requirements

4-04.3(1) Equipment

All equipment necessary for the satisfactory performance of this construction shall be on the project and approved by the Engineer prior to beginning work. If central mix plant methods are used, the central mixing plant shall comply with the following requirements:

The cold aggregate feeder shall be mechanically operated and adjustable to the extent necessary to provide a uniform and continuous flow of materials. These materials shall be deposited in an approved mixer with a sufficient amount of water being added to obtain the required density when spread and compacted. The water shall be weighed or metered, and dispensed through a device providing uniform dispersion across the mixer.

The mixing plant shall be provided with weighing or calibrating devices, feeders, provisions for sampling, and other devices and equipment so designed, coordinated, and operated to produce a uniform mixture, and to permit the sampling of the materials before and after mixing. The mixer shall be kept in good condition, and mixing blades or paddles shall be of proper size, adjustment, and clearance to provide positive and uniform mixing of the mixture at all times.

The capacity of the plant and equipment furnished for the work shall be adequate at all times to provide for efficient and continuous operations insofar as practical.

4-04.3(2) Subgrade

The subgrade shall be prepared as specified in Section 2-06 and shall be approved by the Engineer before placing ballast or surfacing materials.

4-04.3(3) Mixing

Unless otherwise specified, the Contractor may use either, or both, of the following described methods:

1. **Central Plant Mix Method.** The surfacing material and water shall be mixed in an approved mixing plant as described in Section 4-04.3(1). The completed mixture shall be a thoroughly mixed combination of proportioned materials and water, uniform in distribution of particle sizes and moisture content. A mixture containing water in excess of the proportion established by the Engineer will not be accepted.
2. **Road Mix Method.** After material for each layer of surfacing has been placed, the material shall be mixed until uniform throughout by motor graders or other equipment approved by the Engineer. Water to facilitate mixing and compacting shall be added in amounts approved by the Engineer.

4-04.3(4) Placing and Spreading

1. **Central Plant Mix Method.** After mixing, material for each layer of surfacing shall be transported to the roadway in approved vehicles. Vehicles for hauling the mixture shall be capable of depositing the mixture within the receiving hopper of the spreading equipment, or in windrows of uniform size in front of the spreading equipment, with a minimum of segregation of the mix.

   A motor grader may be used as the spreading machine or the spreading machine shall be capable of receiving the material by direct deposit in its hopper from the hauling vehicle or from a uniform windrow, and be capable of spreading and screeding the material to a depth and surface that when compacted will be true to line, grade, depth of course, and cross-section without further shaping.
2. **Road Mix Method.** Each layer of surfacing material shall be spread by equipment that is approved by the Engineer. Equipment that causes segregation of the surfacing material during the spreading operation will not be allowed. Similar types of spreading equipment shall be used throughout the limits of each separate spreading operation. Spreading on small areas of less than 2,000 square yards or on areas irregular in shape, may be accomplished by other means as approved by the Engineer.

The following nominal depth of compacted material shall not be exceeded in any one course without the approval of the Engineer:

Ballast	0.50 foot
Gravel Base	0.75 foot
Crushed Surfacing	0.35 foot

4-04.3(5) Shaping and Compaction

Immediately following spreading and final shaping, each layer of surfacing shall be compacted to at least 95 percent of the standard density determined by the requirements of Section 2-03.3(14)D before the next succeeding layer of surfacing or pavement is placed. The determination of field in-place density shall be made by the Nuclear gauge. When the thickness of surfacing is less than 0.15 foot, density testing will not be required and the Engineer will determine the number of coverages required for the particular compaction equipment available.Vibratory compactors and rollers shall obtain the specified density for each layer. A mist spray of water shall be applied as needed to replace moisture lost by evaporation. The completed layer shall have a smooth, tight, uniform surface true to the line, grade, and cross-section shown in the plans, or as staked.

4-04.3(6) Keystone

When necessary, as determined by the Engineer, crushed surfacing top course shall be used for keystone to key the top surface of ballast, gravel base, crushed surfacing base course, or any other surfacing course that requires keying. The keystone shall be spread evenly on top of the surfacing course by means of approved spreading equipment. The surface shall be watered and, if necessary, bladed lightly until the keystone is worked into the interstices of the surfacing course without excessive displacement and shall be compacted. The operations of adding keystone, wetting, blading, and compacting shall be continued until the course has become thoroughly keyed and compacted.

When keystone is required, that is subject to public traffic, it shall be placed before terminating each day's operation.

Keystone placed for the convenience of the Contractor, with approval of the Engineer, for the purpose of creating a more dense surface on which to pave will be allowed within the top 0.20 foot of crushed surfacing base course, gravel base, or ballast. Keystone placed for this purpose will be paid for at the lower unit contract price for either the base material being keyed or crushed surfacing top course.

4-04.3(7) Miscellaneous Requirements

The surface of each layer of surfacing material shall be maintained true to line, grade, and cross-section by grading, watering, and rolling until placing the next succeeding course. The first course of surfacing material shall be placed on all available subgrade before placing the succeeding course unless otherwise authorized by the Engineer. Unless otherwise approved, there shall be a distance of not less than one station between the construction of any two courses of surfacing or ballast.

Should irregularities develop in any surface during or after compaction, they shall be remedied by loosening the surface and correcting the defects after which the entire area including the surrounding surface shall be thoroughly recompacted. Any additional materials necessary to make the repairs shall be furnished by the Contractor at the unit contract price.

4-04.3(8) Weather Limitations

When, in the opinion of the Engineer, the weather is such that satisfactory results cannot be obtained, the Contractor shall suspend operations until the weather is favorable. No surfacing materials shall be placed in snow or on a soft, muddy, or frozen subgrade.

4-04.3(9) Hauling

Hauling equipment shall be routed over the roadway in a manner to be most effective in the compacting of the surfacing. Hauling over any of the surfacing in the process of construction will not be permitted when, in the opinion of the Engineer, the effect will be detrimental. All loads shall be of uniform capacity unless deviation is expressly authorized by the Engineer.

4-04.3(10) Hours of Work

The Contractor shall arrange surfacing operations so that the placing of materials will be accomplished during daylight hours. However, when necessary to complete the project within the time specified, or to avoid peak periods of public traffic, work may be undertaken during the hours of darkness, provided the Contractor furnishes and operates adequate lighting. Inability to demonstrate reliable and satisfactory results will be reason to order termination of night operations, and the Contractor shall procure additional

equipment and personnel necessary to satisfactorily complete the work as specified while operating during daylight hours only.

4-04.3(11) Shoulder Ballast

Shoulder ballast shall not be placed until the abutting pavement has been completed unless designated by the Engineer. Shoulder ballast shall be placed through a spreader box in one lift. Processing of the shoulder ballast course on the roadway will not be permitted. Compaction shall be accomplished by making a minimum of three passes over the aggregate with a vibratory compactor of a type acceptable to the Engineer. The density requirements of Section 4-04.3(5) shall not apply.

4-04.4 Measurement

Crushed surfacing top course, base course, ballast, and gravel base, when mixed at a central plant, will be measured by the ton. The weight of water added at the plant will be deducted on a daily basis from the total tonnage of aggregates, including water, placed that day which were processed through the central plant and placed on the roadway. The resultant tonnage of surfacing materials will be paid for at the unit contract price. The weight of deducted water will be converted to gallons and will be paid for at the unit contract price for water.

Crushed surfacing top course, base course, ballast, and gravel base, when mixed by the road mix method, will be measured by the ton or by the cubic yard. If measured by the cubic yard, measurement will be made in the hauling conveyance at the point of delivery on the roadway.

Shoulder ballast will be measured by the ton or by the cubic yard.

Crushed surfacing materials for placement in stockpile will be measured by the ton or cubic yard. If measured by the cubic yard, the volume will be determined by cross-sectioning the stockpile.

Maintenance rock will be measured in the same manner prescribed for crushed surfacing materials.

Water used in placing and compacting surfacing materials on the roadway will be measured in accordance with Section 2-07.

4-04.5 Payment

Payment will be made in accordance with Section 1-04.1, for each of the following bid items that are included in the proposal:

"Crushed Surfacing Top Course (or Base Course)", per ton, or per cubic yard.

"Crushed Surfacing Top Course (or Base Course) in Stockpile", per ton, or per cubic yard.

"Crushed Surfacing Top Course (or Base Course) from Stockpile", per ton, or per cubic yard.

"Ballast", per ton, or per cubic yard.

"Ballast in Stockpile", per ton, or per cubic yard.

"Ballast from Stockpile", per ton, or per cubic yard.

"Shoulder Ballast", per ton, or per cubic yard.

"Shoulder Ballast in Stockpile", per ton or per cubic yard.

"Shoulder Ballast from Stockpile", per ton or per cubic yard.

"Maintenance Rock 1/2 In. Minus in Stockpile", per ton, or per cubic yard.

4-05 VACANT

4-06 ASPHALT TREATED BASE

4-06.1 Description

Asphalt treated base consists of a compacted course of base material which has been weatherproofed and stabilized by treatment with an asphalt binder.

The work shall consist of one or more courses of asphalt treated base placed on the subgrade in accordance with these Specifications and in conformity with the lines, grades, thicknesses, and typical cross-sections shown in the Plans or as staked.

4-06.2 Materials

Materials shall meet the requirements of the following sections:

Asphalt	9-02.1
Anti-Stripping Additive	9-02.4
Aggregates	9-03.6

The grade of paving asphalt shall be as required in the contract.

4-06.3 Construction Requirements

4-06.3(1) Asphalt Mixing Plant

Asphalt mixing plants for asphalt treated base shall meet the following requirements:

Heating

The plant shall be capable of heating the aggregates to the required temperature.

Proportioning

The mixing plant shall be capable of proportioning: the aggregates to meet the specifications; and the asphalt at the rate specified by the Engineer. If the aggregates are supplied in two or more sizes, means shall be provided for proportioning or blending the different sizes of aggregates to produce material meeting the specification requirements.

Mixing

The mixer shall be capable of producing a uniform mixture of uniformly coated aggregates meeting the requirements of these Specifications.

4-06.3(2) Preparation of Aggregates

Aggregates for asphalt treated base shall be stockpiled before use in accordance with the requirements of Section 3-02.

The aggregates shall be heated as required by the Engineer.

4-06.3(2)A Mix Design

The mix design requirements for asphalt treated base shall be as described in Section 5-04.3(7)A.

4-06.3(3) Heating of Asphalt Material

Heating of the asphalt material shall conform to the requirements of Section 5-04.3(6).

4-06.3(4) Mixing

The asphalt treated base shall be mixed in accordance with the requirements of Section 5-04.3(8).

4-06.3(5) Hauling Equipment

Hauling equipment for asphalt treated base shall conform to the requirements of Section 5-04.3(2).

4-06.3(6) Spreading and Finishing

Asphalt treated base shall be spread with a spreading machine equipped with a stationary, vibratory, or oscillating screed or cut-off device, subject to the approval of the Engineer. Approval of the equipment shall be based on a job demonstration that the finished product will meet all requirements of the specifications. Automatic controls will not be required.

The temperature of the mixture at the time compaction is achieved shall be a minimum of 185°F.

4-06.3(6)A Subgrade Protection Course

Unless otherwise specified by the Engineer, the Contractor shall place the asphalt treated base as a protection for the prepared subgrade on all sections of individual roadways which are to receive asphalt treated base as soon as 10,000 square yards of subgrade is completed. This requirement shall not be limited to contiguous areas on the project.

The surface of the subgrade protection layer when constructed on a grading project shall conform to grade and smoothness requirements that apply to the subgrade upon which it is placed.

4-06.3(6)B Finish Course

The final surface course of the asphalt treated base, excluding shoulders, shall not deviate at any point more than $^{3}/_{8}$ inch from the bottom of a 10-foot straightedge laid in any direction on the surface on either side of the roadway crown. Failure to meet this requirement shall necessitate sufficient surface correction to achieve the required tolerance, as approved by the Engineer, at no expense to the Contracting Agency.

When Portland cement concrete pavement is placed on an asphalt base, the surface tolerance of the asphalt base shall be such that no elevation lies more than 0.05 feet below nor 0.00 feet above the plan grade minus the specified plan depth of Portland cement concrete pavement. Prior to placing the Portland cement concrete pavement, any such irregularities shall be brought to the required tolerance by grinding or other means approved by the Engineer, at no expense to the Contracting Agency.

4-06.3(7) Density

The asphalt treated base shall be compacted to a density of not less than 80 percent of the maximum theoretical density established for the mix by WSDOT FOP for AASHTO T 209. The density of the base shall be determined by means of tests on cores taken from the roadway or with the nuclear gauge in accordance with Section 5-04.3(10)B. The frequency of these tests shall be at the discretion of the Engineer, but in no case shall it be less than one control lot for each normal day's production. The use of equipment which results in damage to the materials or produces substandard workmanship will not be permitted.

4-06.3(8) Anti-Stripping Additive

An anti-stripping additive shall be added to the asphalt material in accordance with Section 9-02.4, when directed by the Engineer.

4-06.4 Measurement

Asphalt treated base including paving asphalt will be measured by the ton.

4-06.5 Payment

Payment will be made in accordance with Section 1-04.1, for each of the following bid items that are included in the proposal:

"Asphalt Treated Base", per ton.

"Anti-Stripping Additive", by force account.

"Anti-Stripping Additive" will be paid for in accordance with Section 1-09.6 except that no overhead, profit or other costs will be allowed. Payment will be made only for the invoice cost of the additive. The quantity of asphalt material shall not be reduced by the quantity of anti-stripping additive. For the purpose of providing a common proposal for all bidders, the Contracting Agency has entered an amount in the proposal to become a part of the total bid by the Contractor.